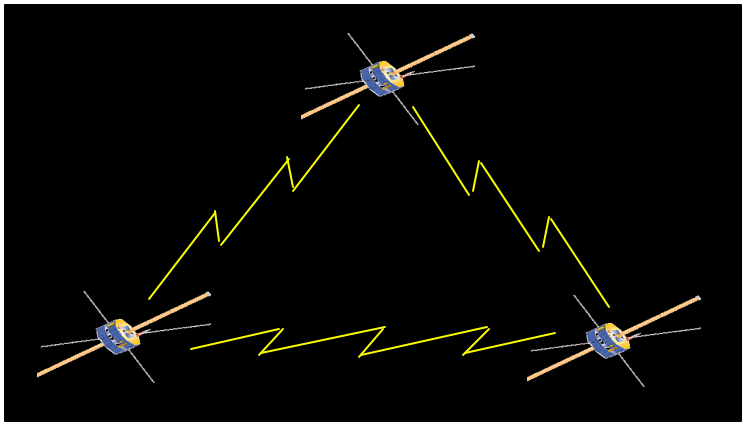
# Precision Formation Flying Spacecraft Mission Design

## A Candidate 2003 NASA Academy Group Project



**Project Description:** Design a multi-spacecraft precision formation flying science mission, emphasizing the formation flying architecture and formation design elements

**Mission Concept:** Deployment of 3-6 free flying spacecraft to an Earth-Moon Libration Point to perform milli-arcsecond imaging

**Key Design Elements**

- Relative navigation sensors and algorithms
- Formation control system (actuators and algorithms)
- Inter-satellite communication systems and network design
- Distributed modeling & simulation system
- Autonomous constellation management architecture
- Formation design to maximize science payoff for minimum fuel consumption

**Key Work Elements:**

- System requirements analysis
- Trade study for number of spacecraft required for given cost envelope
- Mission design, trajectory design, formation design, and fuel analysis
  - Identification of launch options
- Relative navigation requirements analysis, sensor selection, design, and algorithm analysis
- Formation control requirements analysis, actuator selection, design, and algorithm analysis
- Intersatellite communication system and network design

**Disciplines involved:**

- Aerospace engineering
  - astrodynamics
  - controls
  - design
- Electrical engineering
  - communications
  - controls
- Physics
  - astrophysics
  - astronomy
  - astrodynamics
  - optics
- Computer Science
  - software
  - networking theory